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Conservation
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Research

Conservation
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Project
Description
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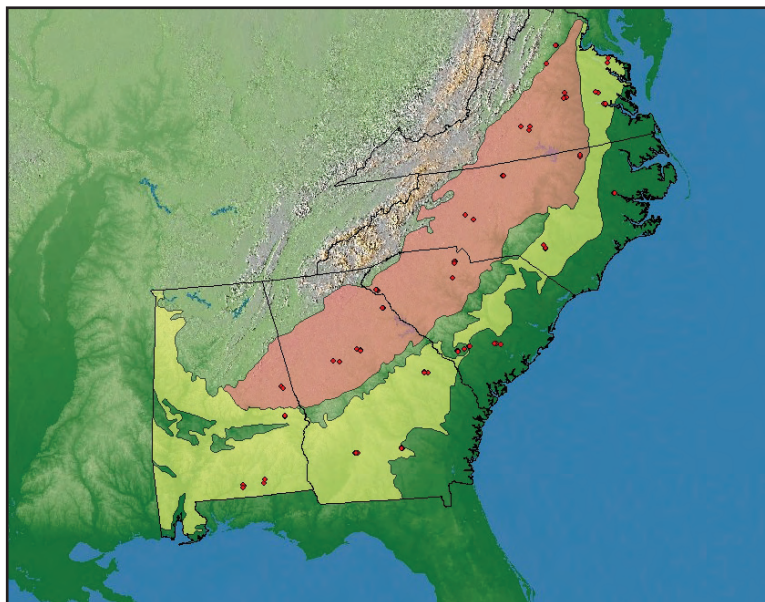
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Conservation Systems Research

Soil Management and Land Effects on Carbon Sequestration

CONSERVATION SYSTEMS PROJECT DESCRIPTION NO. 55



Sampling locations in the southeastern USA.

Researchers

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The Challenge

The heat and rainfall of the southeastern USA make its soils susceptible to degradation. The long history of tillage and resulting soil erosion has depleted soil organic matter in the region, causing poor soil quality and productivity.

Increasing organic matter improves soil structure, drainage, and aeration, stores nutrients, and promotes biological activity in the soil ecosystem. The health of the soil ecosystems and its productivity is improved. Increasing organic matter also mitigates some of the greenhouse effect by storing (sequestering) carbon from the atmosphere as soil organic carbon (SOC).

Conservation tillage systems that minimize tillage and include residue from cover crops increase SOC over time. How much depends on the management system, soil properties and land characteristics.

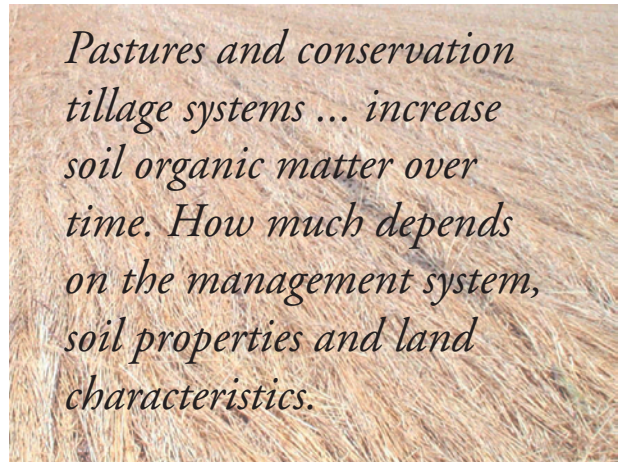
The Experiment

Beginning in 2003, soil samples and management information were collected from 90 sites in the Piedmont and Coastal Plain regions of the southeastern USA, including Alabama, Georgia, South Carolina, North Carolina, and Virginia. These samples include conventional tillage, conservation tillage, and pasture management systems. The objectives of this study are to:

- A. Measure the change in soil carbon due to management.
- B. Determine the effect of climate and soil texture on soil carbon.
- C. Isolate soil carbon at different soil depths to understand the effects of long-term management.



Collecting a soil sample.



What We Have Learned

Overall, soil organic carbon was greatest in pastures, less in conservation tillage systems, and was lowest in conventional tillage systems.

Management affected SOC mainly in the top 5 cm (2 inches).

Climate (mainly temperature) and soil texture also had important effects on the amount of SOC. Sites with cooler climates and greater precipitation had higher SOC.

These preliminary results suggest that farmers can improve their soils health and productivity through management. Understanding the effects of climate and soil texture will suggest realistic goals and an estimate of their soil quality status.

Related Publications

Causarano, H.J, A.J. Franzluebbers, D.W. Reeves, and J.N. Shaw. 2006. Soil organic carbon sequestration in cotton production systems of the southeastern USA: A review. *Journal of Environmental Quality* (in press).